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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

Enhanced Preliminary Assessment Report:

Topsfield Army Housing Units Topsfield, Massachusetts

September 1989

prepared for

Commander
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

prepared by

Environmental Research Division
Argonne National Laboratory
Argonne, Illinois 60439

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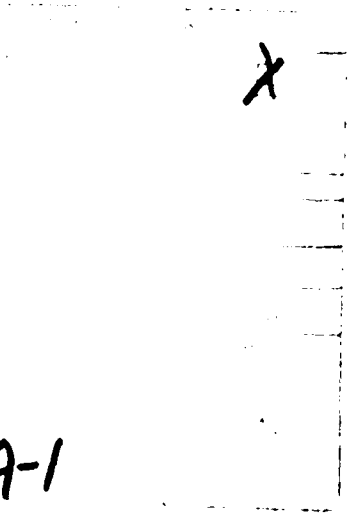

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Environmental Research Division,
Argonne National Laboratory, Argonne, Illinois 60439-4815

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Argonne National Laboratory has conducted an enhanced preliminary assessment of the Army housing property located in Topsfield, MA. The objectives of this assessment include identifying and characterizing all environmentally significant operations, identifying areas of environmental contamination that may require immediate remedial actions, identifying other actions which may be necessary to resolve all identified environmental problems, and identifying other environmental concerns that may present impedients to the expeditious sale of this property.

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SUMMARY

The Topsfield housing facility was built in 1958, originally as part of a Nike missile antiaircraft defense battery, and consists of 16 houses. Although the area was part of the missile battery, it has always been used solely for the housing of military personnel. Industrial activities have never occurred on-site. No problem associated with the collection and disposal of solid wastes for the facility was reported.

The following actions are recommended prior to release of this property:

- Visually inspect the remaining units to determine the possible presence and condition of asbestos-containing water pipe insulation materials and remediate any problems found.

- Remove the abandoned oil tanks near the leach field and dispose of them in an acceptable manner.

The recommendations assume this property will most likely continue to be used for residential housing.

1 INTRODUCTION

In October 1988, Congress passed the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526. This legislation provided the framework for making decisions about military base closures and realignments. The overall objective of the legislation is to close and realign bases so as to maximize savings without impairing the Army's overall military mission. In December 1988, the Defense Secretary's ad hoc Commission on Base Realignment and Closure issued its final report nominating candidate installations. The Commission's recommendations, subsequently approved by Congress, affect 111 Army installations, of which 81 are to be closed. Among the affected installations are 53 military housing areas, including the Topsfield housing area addressed in this preliminary assessment.[1]

Legislative directives require that all base closures and realignments be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA). As a result, NEPA documentation is being prepared for all properties scheduled to be closed or realigned. The newly formed Base Closure Division of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) is responsible for supervising the preliminary assessment effort for all affected properties. These USATHAMA assessments will subsequently be incorporated into the NEPA documentation being prepared for the properties.

This document is a report of the enhanced preliminary assessment (PA) conducted by Argonne National Laboratory (ANL) at the Army stand-alone housing area in Topsfield, Mass.

1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program by assessing the environmental quality of the installations proposed for closure or realignment. Preliminary assessments are being conducted under the authority of the Defense Department's Installation Restoration Program (IRP); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 91-510, also known as Superfund; the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499; and the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, Public Law 100-526.

In conducting preliminary assessments, ANL has followed the methodologies and procedures outlined in Phase I of the IRP. Consequently, this PA addresses all documented or suspected incidents of actual or potential release of hazardous or toxic constituents to the environment.

In addition, this PA is "enhanced" to cover topics not normally addressed in a Phase I preliminary assessment. Specifically, this assessment considers and evaluates the following topical areas and issues:

- Status with respect to regulatory compliance,
- Asbestos,
- Polychlorinated biphenyls (PCBs),
- Radon hazards (to be assessed and reported on independently),
- Underground storage tanks,
- Current or potential restraints on facility utilization,
- Environmental issues requiring resolution,
- Health-risk perspectives associated with continued residential land use, and
- Other environmental concerns that might present impediments to the expeditious "excessing," or transfer and/or release, of federally owned property.

1.2 OBJECTIVES

This enhanced PA is based on existing information from Army housing records of initial property acquisition, initial construction, and major renovations and remodeling performed by local contractors or by the Army Corps of Engineers. The PA effort does not include the generation of new data. The objectives of the PA include:

- *Identifying and characterizing all environmentally significant* operations (ESOs),
- Identifying property areas or ESOs that may require a site investigation,
- Identifying ESOs or areas of environmental contamination that may require immediate remedial action,
- *Identifying other actions that may be necessary to address and* resolve all identified environmental problems, and
- Identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

1.3 PROCEDURES

The PA began with a review of Army housing records located at Fort Devens, Mass., approximately 35 miles northwest of Boston the week of May 15-19, 1989. Additional information was obtained from the Army Corps of Engineers District Office in Waltham, Mass., on May 17 and from conversations with personnel from the office of the Area Engineer, Fort Devens on May 18. A site visit was conducted at Topsfield, Mass. on May 16, 1989, at which time additional information was obtained through personal observations of ANL investigators. Photographs were taken of the housing units and surrounding properties as a means of documenting the condition of the housing units and immediate land uses. Site photographs are appended.

All available information was evaluated with respect to actual or potential releases to air, soil, and surface and ground waters.

Access to individual housing units was obtained through the senior occupant at the facility.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

The Topsfield housing area is located south of the center of the town of Topsfield, in Essex County, Commonwealth of Massachusetts. The facility occupies 8.93 acres of land in fee and 2.84 acres in easements and license from the town of Topsfield for drainage.[2] The land parcel on which the facility is located is irregular in shape, having 1,200 feet of road frontage, lying approximately three feet below road grade on the north, and gradually rising up to 15 feet above road grade to the south.[3]

The housing units were built in 1958.[2,4] No additional major construction has taken place on the property since that time. The Army Corps of Engineers Office for the southeast Boston area, located in Waltham, Mass., is responsible for major renovations and upgrading within the facility. Routine maintenance is conducted by the Directorate of Engineering and Housing at Fort Devens, Mass.

Figures 1 and 2 show the general location of the facility.

2.2 DESCRIPTION OF THE FACILITY

Figure 3 presents the site plan of the housing property and shows the area's irregular shape.

Housing Units

Each of the 16 houses is a "capehart" style, named by the builder, National Homes. Each single-family unit includes three bedrooms and a family living-dining area, with an attached carport and a storage room. The houses are built on concrete slabs, with tile-covered floors.[4] Their walls are covered inside with sheetrock panels and outside with plywood and original asbestos shingles; the exteriors were later covered with vinyl siding. The roofs of the houses are covered with asphalt shingles on wood sheathing.

Utilities

No water wells exist on the property, and each house has been supplied with city water since initial construction. The city has also provided electric power since initial construction. The area's garbage is picked up by a local contractor and disposed of off-site in a landfill located some distance from the area. No problem associated with the collection and disposal of the wastes has been reported.

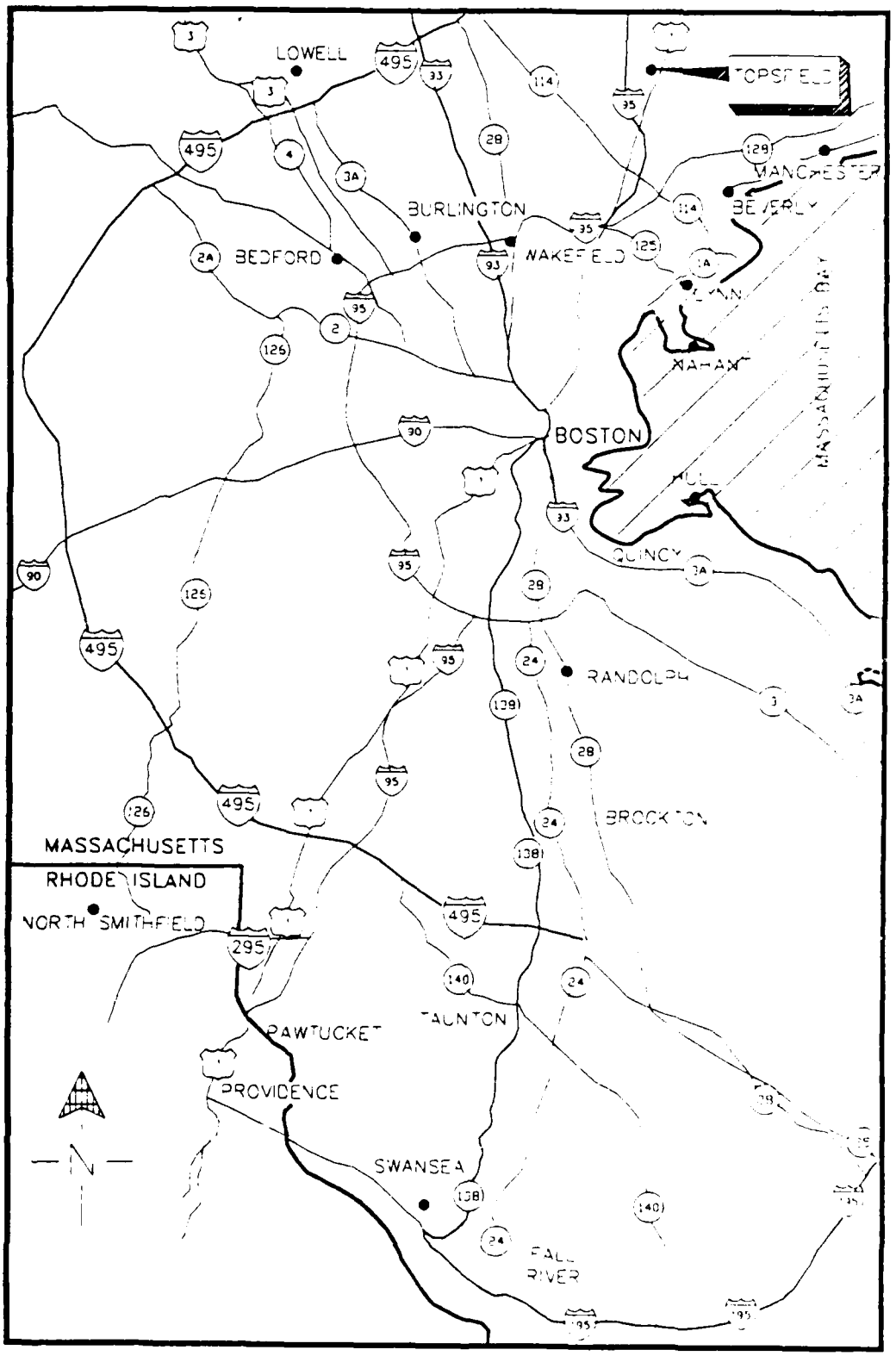

FIGURE 1 Location Map of Massachusetts Army Housing Facilities

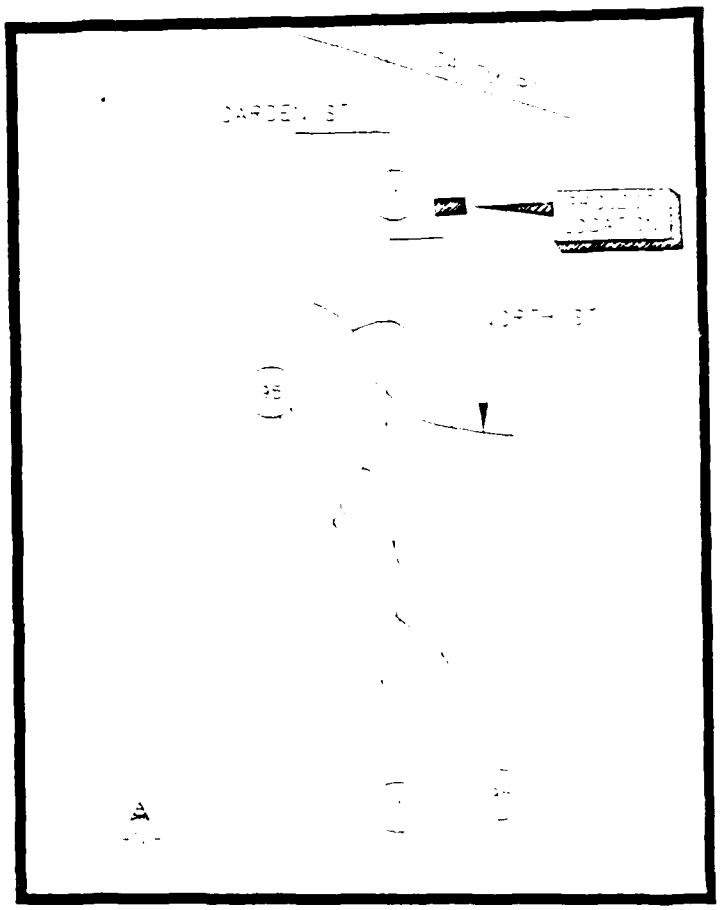

FIGURE 2 Vicinity Map of Topsfield Army Housing Units

Sewage

Since initial construction, sewage has been disposed of in a local system. The main sewer line is located in the center of the property, with feeder lines extending to septic tanks located behind each house. This sewer line stretches downslope to a leach field, approximately 300 feet away.

Fuel Storage

The houses have forced-hot-air furnaces. Fuel oil was initially stored in 275-gallon underground tanks, installed during original housing construction, but in 1986 all underground tanks were removed and replaced with above-ground tanks located at the rear of each of the houses.

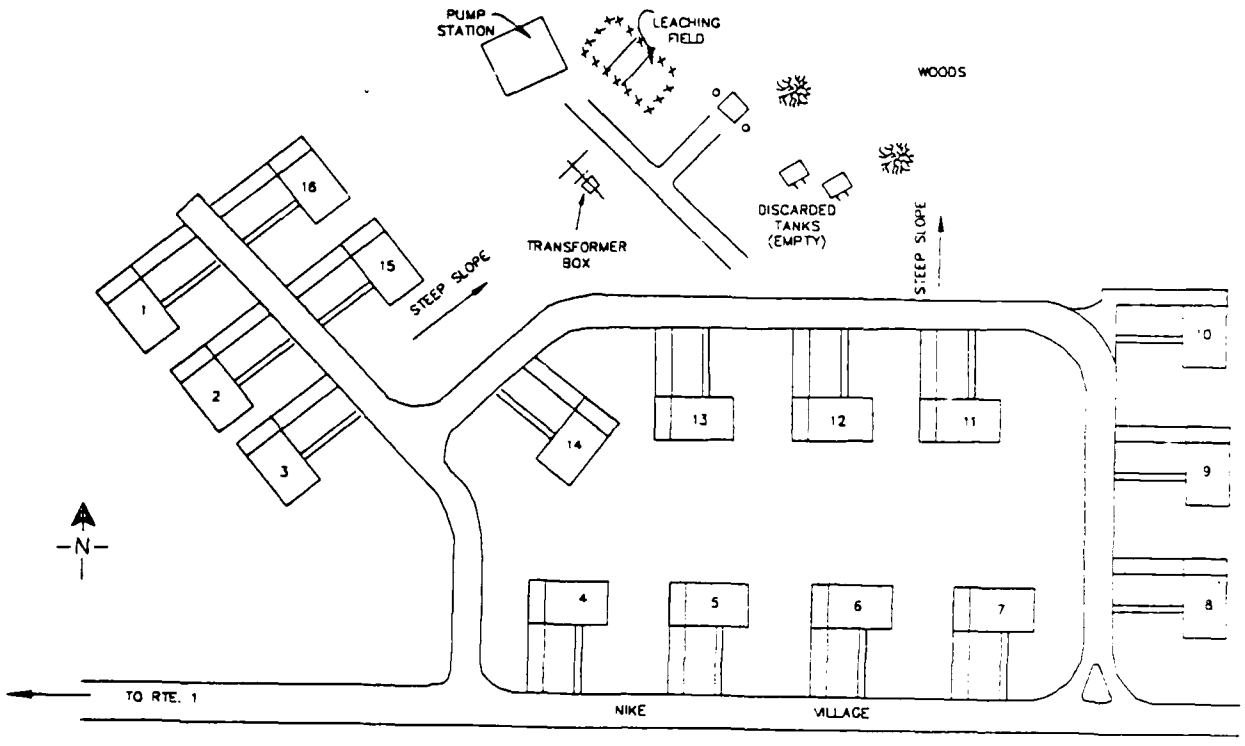

FIGURE 3 Site Plan Map of Topsfield Army Housing Units

Storm Drainage Systems

The property is drained by open ditches or surface run-off and also by a storm sewer running downslope for 110 feet.

Other Permanent Structures Or Property Improvements

No such structures or improvements exist.

2.3 PROPERTY HISTORY

2.3.1 Nike Defense Program and Typical Battery-Level Practices

Generic information on the national Nike antiaircraft defense program has been compiled in two studies, one commissioned by the Army Corps of Engineers[5] and the other by the U.S. Army Toxic and Hazardous Materials Agency.[6] In both studies, independent contractors relied on information contained in unclassified documents related to the Nike surface-to-air missile program, including engineering drawings and specifications (for the facilities and the missiles themselves), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operations and maintenance of Nike facilities. Taken together, these two

reports represent the most complete assemblage of generic information on the Nike missile program from an environmental perspective. Salient points from both reports are condensed below.

At its zenith in the early 1960s, the Nike program included 291 batteries located throughout the continental United States. The program was completely phased out by 1976, with many of the properties sold to private concerns or excessed to state or local governments for nominal fees.

Nike Ajax missiles were first deployed in 1954 at installations throughout the continental United States, replacing, or in some cases augmenting, conventional artillery batteries and providing protection from aerial attack for strategic resources and population centers. Typically, Nike batteries were located in rural areas encircling the protected area. The Ajax was a two-stage missile using a solid-fuel booster rocket and a liquid-fuel sustainer motor to deliver a warhead to airborne targets.

The Ajax missile was gradually replaced by the Nike Hercules missile, introduced in 1958. Like the Ajax, the Hercules was a two-stage missile, but it differed from the Ajax in that its second stage was a solid-fuel rather than liquid-fuel power source and its payload often was a nuclear rather than conventional warhead. Ajax-to-Hercules conversions occurred between 1958 and 1961 and required little change in existing Nike battery facilities. A third-generation missile, the Zeus, was phased out during development and consequently was never deployed.

A typical Nike missile battery consisted of two distinct and separate operating units, the launch operations and the integrated fire control (IFC) operations. The two operating areas were separated by distances of less than two miles, with lines of sight between them for communications purposes. A third separate area was also sometimes part of the battery. This area was typically equidistant from the two battery operating sites and contained housing for married personnel assigned to the battery. Occasionally, these housing areas also contained battalion headquarters, which were responsible for a number of Nike batteries.

Depending on area characteristics and convenience, the housing areas were often reliant on the launch or IFC sites for utilities such as potable water, electrical power, and sewage treatment. In those instances, buried utility lines connected the housing area to one or both of the other battery properties. It is also possible, however, that housing areas were completely independent of the missile launcher and tracking operations. In those instances, the necessary utilities were either maintained on the housing site or purchased from the local community. In many localities, as the character of the land area around the housing units changed from rural to suburban or urban, communities extended utility services to the housing unit locations, in which case conversions from independent systems to community systems were made.

A large variety of wastes was associated with the operation and maintenance of Nike missile batteries. Normally encountered wastes included benzene, carbon tetrachloride, chromium and lead (contained in paints and protective coatings), petroleum hydrocarbons, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene. Because of the rural locations of these

batteries, and also because very few regulatory controls existed at that time, most of these wastes were managed "on-site." (Unused rocket propellants and explosives, however, would always have been returned to central supply depots and not disposed of on-site.) It is further conceivable that wastes generated at one of the Nike properties may have been transferred to its companion property for management or disposal.

Wastes related to missile operation and maintenance would not have been purposely transferred from a battery operating area to a housing area with no facilities for waste management or disposal. In some instances, however, the sewage treatment facilities for all Nike battery properties were located at the housing area; that possibility cannot be automatically ignored. Finally, where housing areas received various utilities from either of the operating areas, it is also possible that wastes disposed of on those other properties may have migrated to the housing area via the buried utility lines. And since decommissioning of the Nike batteries did not normally involve removal of buried utility or communication lines, any such contaminant migration is likely to have gone unnoticed.

2.3.2 Topsfield Housing Units

The Topsfield housing units were built in 1958 to provide family housing for military personnel assigned to the Topsfield Nike missile battery. There are no records indicating that missile-related wastes were either delivered to or managed at this property. Furthermore, since its initial construction, this property functioned independently of the rest of the Nike battery with respect to water, sewer, and electrical utilities.

Sixteen single-family houses were erected, each with a septic tank and plumbing connecting it to a central sewage leach field. The leach field is on the northern side of the property, approximately 300 feet downslope.

The site investigation revealed that a vinyl siding was placed over the original asbestos siding of each unit, although the date of this action is unknown. The action was confirmed by the Army Corps Engineers office in Waltham, Mass. It is assumed that the siding was added for cosmetic reasons and that the original asbestos siding was still in good condition and was left in place.

Since the initial property development in 1958, no other permanent structures have been added, none of the original structures has been razed, but renovations have taken place. In 1962 the sewage treatment system was built, and in 1966 a small piece of land was acquired for flowage rights in order to modify and extend the leaching field. In 1979, smoke/heat detectors were installed in each house, and in 1986 the underground oil-fuel tanks were replaced with new above-ground tanks.

Visual inspection of unit #15 revealed that water pipe insulation in the utility room was badly deteriorated. It is assumed that insulation in the remaining units was in a similar condition. No records were available indicating that this insulation contained asbestos.

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

Topsfield, with an estimated 1980 population of 5,709,[7] lies within the New England Seaboard lowland. The soils are generally sandy, loamy, and well drained. The Ipswich River is the major drainage pathway in the area, and there are many freshwater swamps.[8]

The Topsfield housing units are situated atop a steep slope overlooking the Putnamville Reservoir, a quarter of a mile to the south. The general topography of the surrounding area is rolling terrain, and the backlands of the facility are covered with brush and trees. The land is gently rolling to the east.

2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

Topsfield is located in the Ipswich River Basin of the Seaboard Lowland Section of the New England Physiographic Province. The topography of the area is typified by low, rounded hills rising out of the swampy lowland and by a number of lakes, ponds, and creeks. Lowlands range in elevation from sea-level to approximately 140 feet at the tops of many small rounded hills. Lowlands lack a clearly defined drainage pattern and are poorly drained.[9]

The Ipswich River originates in the southwest corner of the basin and flows northeast along a meandering course 35 miles to its mouth in Plum Island Sound. Along its course, flowing through nearly level fresh-water marshes, the river falls 115 feet (35 meters).[10]

Mean annual temperature is about 50°F. Mean annual precipitation in the area is about 42 inches per year, of which 28 inches evaporates and transpires.[9] Part of the remainder travels overland directly to streams and, during or immediately after storm periods, makes up a large part of the increased streamflow. However, most of the water not evaporated or transpired percolates through the ground to the water table and then moves to steams, where it becomes the major component of annual streamflow. Groundwater discharge may be as much as two-thirds of the average annual runoff and, in unregulated streams, is commonly the sole supply for streamflow during low-flow periods. The 1-year 24-hour rainfall is about 2.5 inches in this area.

Soils of the study area have formed since the retreat of the Wisconsin ice sheet.[11] Soil development reflects the influence of glaciation. Generally, the Paxton-Hollis-Canton and the Canton-Paxton-Merrimac soil associations have formed on upland hills and ridges that are manteled with glacial till. The Hinckley-Windsor-Much association has formed on glacial outwash deposits and the Dune Land-Tidal Marsh-Beaches association has formed along the coast.

Unconsolidated glaciofluvial deposits of sand and gravel constitute the principal aquifers in the area. A crystalline bedrock aquifer beneath the unconsolidated deposits is of secondary importance. The crystalline-bedrock aquifer consists primarily of igneous and metamorphic rocks including Dedham grano-diorite of Devonian age, a Pre-Cambrian Marlboro formation, and Carboniferous-age metamorphic rocks. The rocks have been

folded, fractured, and faulted. Bedrock exhibits low porosity, specific yield, and hydraulic conductivity. Wells drilled in bedrock for domestic water supplies are commonly 100 to 300 feet deep and generally yield 8-10 gallons per minute.

The unconsolidated deposits are composed of till, stratified drift, wind-laid, wetland, alluvial, and beach and dune sediments. The till is of two types, an upper till and a lower one. Generally, lower till has a high content of silt and clay and is dense, compact, fine-grained, and poorly sorted. Upper till usually contains larger amounts of sand, cobbles, and boulders, a wider range of grain sizes, and is less compact. Both tills are unfavorable for development of municipal water supplies. Stratified drift consisting of glaciofluvial deposit of ice-contact, outwash, and marine sediments overlies most of the till. Ice-contact and outwash deposits are major water-bearing units in the basin. Ice-contact deposits are predominantly sand and gravel, with a small percentage of silt and clay. Outwash deposits are composed mostly of sand, with small amount of silt, clay, and gravel. Wetland deposits are found overlying outwash in the lowlands, till in the upland depressions, and tidal flats along the coast. They consist of peat and muck intercalated with silt and sand. Porosity of wetland deposits is large, but their vertical hydraulic conductivity is very low. Wind deposits, alluvium, and beach and dune deposits comprise only a small portion of the basin.

Precipitation is the principal source of recharge to the groundwater aquifer. Direct infiltration of rain and snow melt into outcrops of outwash, ice-contact, and wetland deposits acts as the primary recharge mechanism; because of low hydraulic conductivity and steeper slopes, recharge through till and bedrock outcrops is minimal. Discharge of groundwater in the basin is mainly from well pumping, evapotranspiration, and seepage to ponds, springs, wetlands, and streams. Water-table levels are generally highest in the late winter and spring and lowest in the late summer and fall.

Water in the Ipswich River basin is chemically compatible with domestic and industrial uses. The water is weakly alkaline to weakly acidic and soft to moderately hard. The predominant cation and anion are calcium and bicarbonate, respectively. Surface water in the basin received a B water-use classification from the Division of Water Pollution Control.[12] The 1978 water quality survey of the Ipswich River basin by the Division of Water Pollution Control reported a mean turbidity of the Ipswich River as 1.9 turbidity units. Groundwater quality is generally within the recommended concentration limits for chemical constituents except for manganese and iron. Iron- and manganese-bearing minerals present in geologic formations cause unacceptable concentrations of iron and manganese in the groundwater. Water-treatment facilities are used to remove the objectionable concentrations of these constituents.

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

3.1 SEPTIC SYSTEM PROBLEMS

The sanitary sewage is transported by a sewer network connected to each house and ending at a common leach field. It is documented that there were some maintenance problems with the sewer system in the site, and that the system was therefore modified by extending the existing leach field to the edge of the present property line.[13] The modification of the sewer system consisted mainly in extending the leach field and expanding the flowage rights.

3.2 FUEL-OIL STORAGE TANKS

Currently, no underground oil-fuel storage tanks exist in the facility. All underground 275-gallon tanks originally installed in 1958 have been removed from the front of each house and have been replaced by above-ground tanks located behind each house. Army Corps of Engineers representatives have indicated that these tank replacements were the result of good engineering practice and not because leaks were identified or suspected. No deliberate soil tests were performed in the excavations of the underground tanks, but it has been reported that, at the time the tanks were excavated, no leaks were found. Some of the current above-ground tanks evidenced oil spilled around them, from accidental leakage during the filling procedure.

3.3 WATER PIPE INSULATION

Water pipe insulation in unit #15 was found to be badly deteriorated. It is assumed that insulation in the remaining units is in similar condition. There are no housing records indicating that this insulation contains asbestos, but visual inspection suggests that possibility.

3.4 ABANDONED TANKS

During the site visit on May 16, 1989, the ANL team investigators discovered two empty oil-storage tanks abandoned in the woods near the sewage treatment system. Since all the underground oil tanks were recorded as being scrapped by a local contractor[14] when they were replaced with above-ground tanks, the source of the abandoned tanks is unknown. No spilled oil was in evidence around them.

4 KNOWN AND SUSPECTED RELEASES

No releases are known or suspected to have occurred at the facility or its surrounding area. No hazardous materials or hazardous wastes have been reported on-site, and no evidence of contamination from housing activities has been documented.

During the site visit, ANL team investigators noted in one of the houses (#15) that the insulation around a hot water pipe had badly deteriorated. The deteriorated water pipe insulation may contain asbestos and, if so, may have been the source of asbestos release to the indoor air of the housing units.

Small amounts of fuel oil have apparently been spilled around the currently used above-ground storage tanks, probably as the result of careless tank filling or overfilling. The volumes involved are very minor, however, and no significant environmental impact has resulted.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although these housing units were originally developed in support of a Nike missile battery, all available documentation and circumstantial evidence support the conclusion that this housing property was completely independent of the battery's operational activities. No missile-related wastes were delivered to this property for management or disposal. Furthermore, since the property was independent of Nike operations with respect to all necessary utilities, there is no possibility of migration of missile-related wastes along buried utility lines.

Water-pipe insulation in one of the units was badly deteriorated. This insulation material may contain asbestos.

Empty oil-storage tanks discovered in the woods adjacent to the housing property appear not to be associated with the housing property; they were apparently discarded by unknown persons. No evidence of spillage was discovered in the vicinity of the abandoned tanks.

6 RECOMMENDATIONS

The Topsfield housing area presents no imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions are warranted for this site.

The following actions are recommended before excessing the property.

- Visually inspect the remaining units to determine the possible presence and condition of asbestos-containing water pipe insulation and remediate any problems found.

- Remove the abandoned oil tanks near the leach field and dispose of them in an acceptable manner.

The recommendations assume this property will most likely continue to be used for residential housing.

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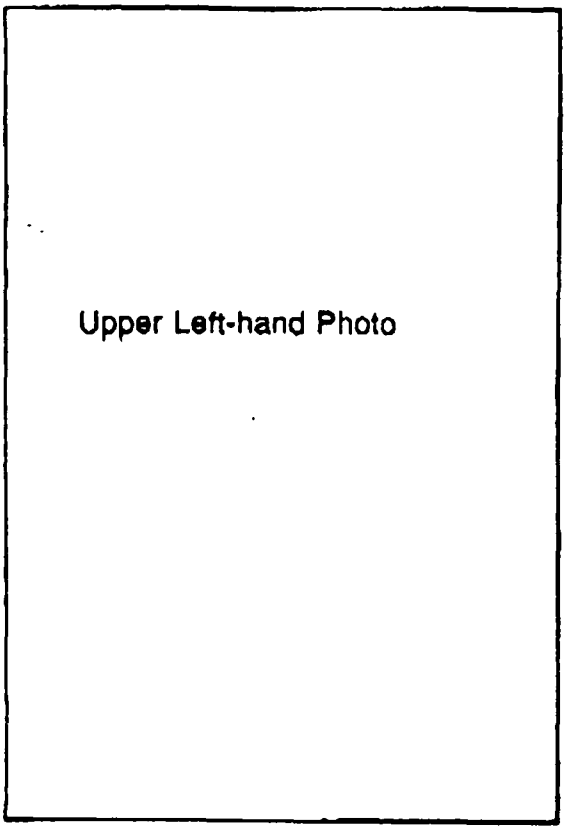
APPENDIX:

PHOTOGRAPHS OF TOPSFIELD HOUSING FACILITY AND SURROUNDING LAND6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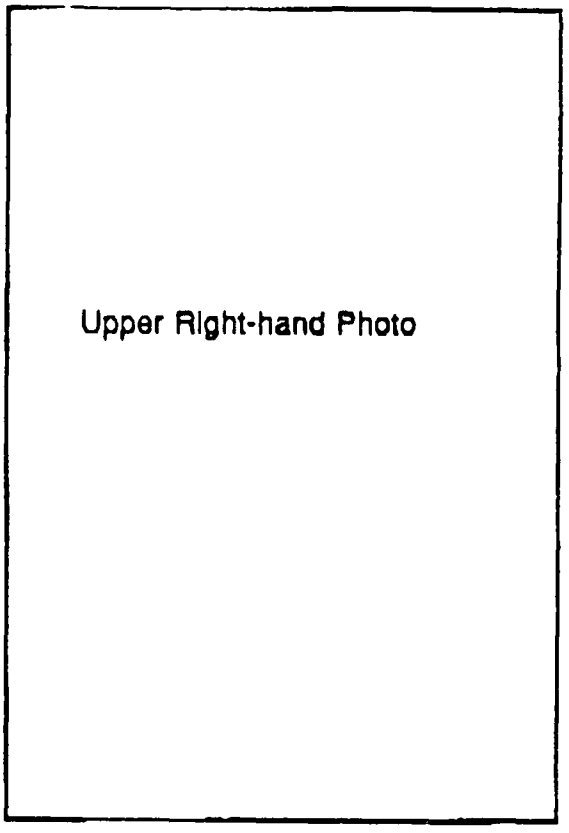
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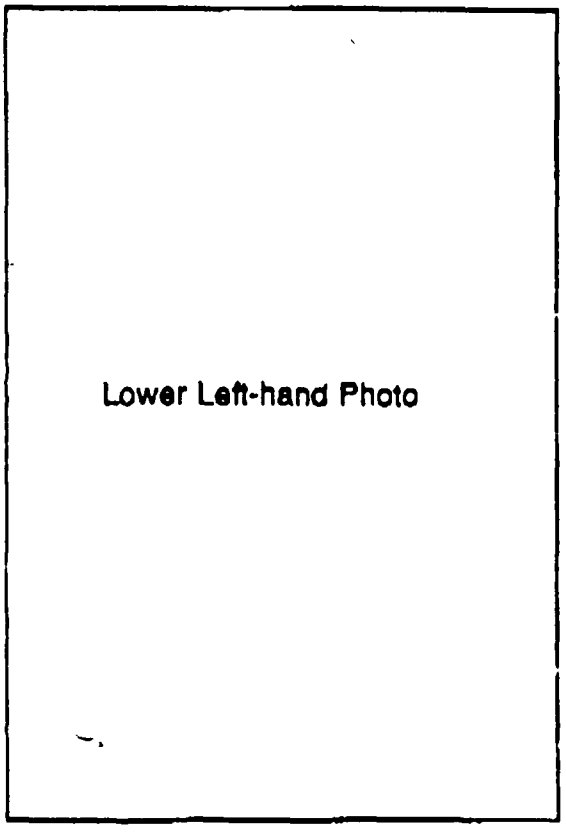
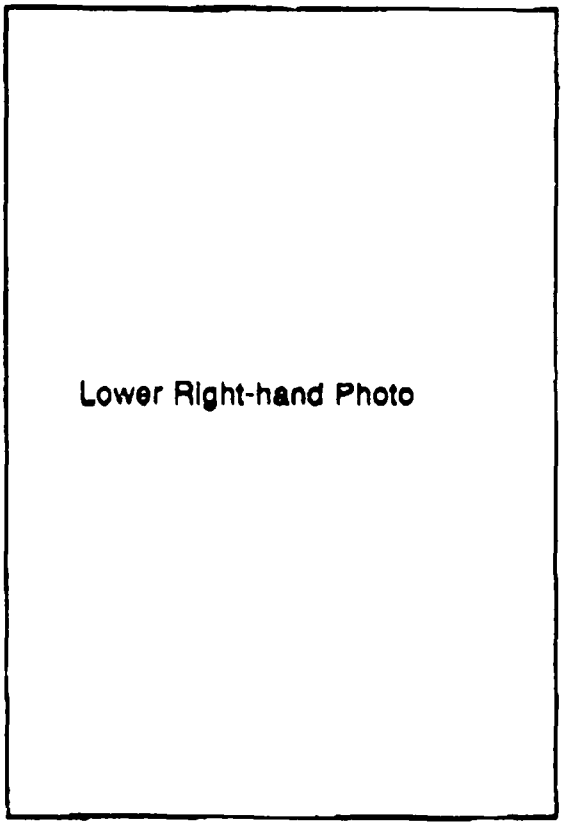

Lower Left-hand Photo


Lower Right-hand Photo

TOPSFIELD, MASSACHUSETTS

(All photographs for this housing area were taken 5/16/89.)

Page 1:

Upper left-hand photo: Southeastern view from the housing area, showing an old Nike site just beyond the property fence.

Upper right-hand photo: Abandoned tanks found in the woodlands next to the pump station on the housing property.

Lower left-hand photo: Houses built on step-like terraced land; the 275-gallon aboveground tank is built on a concrete slab.

Lower right-hand photo: Old Nike site, located less than a mile from the housing area.

Page 2:

Upper left-hand photo: View of the common leachfield for the housing area, located across from the pumping station.

Upper right-hand photo: Typical view of the in-ground trash bin found at each of the housing units.

Lower right-hand photo: Eastern view from the housing area, showing the pumping station.